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THE CRITTER COMPANY

Biological Remediation of Hydrocarbons



B I O R E M E D I A T I O N

THE DECOMPOSITION OF ORGANIC MATERIAL BY MICROBIAL ACTION

CDF002898

STATEMENT OF QUALIFICATIONS

THE COMPANY

The Critter Company, Inc. (TCC) is an environmental service company specializing in biological remediation of hazardous wastes. TCC was established in 1991 as a venture combining technical experts in the field of applied bioremediation with engineering and business professionals. TCC is engaged in research, development, and commercial applications of micro biological technologies that use mixtures of naturally occurring microorganisms in conjunction with a unique proprietary biocatalyst to accelerate the biodegradation of organic waste.

Unlike most bioremediation firms, TCC grows its own microorganisms. Currently, TCC manufactures microbial products that will biodegrade common petroleum products, greases, industrial wastes, heavy motor oils, and even synthetic oil, which usually is very difficult to treat. In addition to our corporate headquarters in Tucson, Arizona, TCC has 3 regional offices, (Including Environmental Resources) providing prompt mobilization to all areas of the United States.

Environmental Resources, Inc. (ERI) was formed in 1993 to provide marketing and technical support for our parent company, The Critter Company. Together, The Critter Company and Environmental Resources have successfully treated a wide variety of contaminated sites in 9 southwestern and midwestern states. TCC and ERI carry all proper liability insurance, and all of our treatment specialists are OSHA health and safety trained.

BIOREMEDIATION

BIOREMEDIATION is a proven, cost-effective solution for cleaning up contaminated sites. Major oil companies and EPA Superfund sites have been successfully using bioremediation for years. THE BIOREMEDIATION PROCESS incorporates naturally occurring microorganisms that have been screened and cultivated for their ability to rapidly degrade a wide variety of hazardous materials. In many cases, sites are cleaned to acceptable levels in as little as 3-4 weeks. In short, the process allows man to "speed up" nature. The process will convert hazardous hydrocarbon waste to carbon dioxide, water, and other biologically accepted intermediate organic waste. When hydrocarbons are degraded, the soil will convert to an activated condition, suitable for normal use. The microbial population will decline as the hydrocarbon food source is reduced. The effected ecosystem will eventually return to its natural microbial base level.

Both the microbes and biocatalyst are natural products and present no danger to the environment or human health. THE BIOREMEDIATION PROCESS is the leading edge of scientific efforts to restore polluted environments to their natural state in the best way possible, using natural methods.

PORTFOLIO OF SERVICES

- 1) **State/EPA Compliance Consulting:** Assurance Funds applications
- 2) **In-situ applications (i.e. in place):** In situations where soil removal is impractical, bioremediation can be used to treat the contaminate in place without disturbing the site. Ground water can also be treated with a pump and treat method.
- 3) **Above ground soil clean up:** Contaminated soil stored above ground can be quickly degraded using bioremediation. A large variety of contaminants including diesel, gasoline, waste oil, creosote, and other organic wastes can be degraded on site at a fraction of the cost of other types of treatment.
- 4) **Oil Spills:** Lagoons, lakes, lake beds, shorelines, and ponds can be treated with a minimum of equipment.
- 5) **Storage Tanks:** Oil crust, sludge, and other residue can be cleaned in the tank thus eliminating contaminated discharges.
- 6) **Manufacturing Plants:** Cutting oils, solvents, pipe thread dope, hydraulic oil, diesel, etc. can accumulate in the soil around industrial sites. Bioremediation can eliminate the organic wastes and confine hauling cost to metals and inorganic matter.
- 7) **Waste Water Treatment Plants:** Bioremediation aids in reducing the volume of sludge and improves settling in treatment plants. Results have demonstrated less odor, quicker recovery from overloads, and improved efficiency. Electrical and material savings are also achieved.
- 8) **Bio-reactor:** Systems are available to treat groundwater, organic pollutants, and oily liquids on site prior to discharge into the sewage system.
- 9) **Oil Well Secondary and Tertiary Recovery:** Older wells can become more productive by using bioremediation to separate oil from the soil, using the fatty acids produced to solubilize the oil; and control paraffin buildup.

SUMMARY OF PROJECTS

THE CRITTER COMPANY currently has over \$1,000,000 of bioremediation projects completed, underway, or in the permit process for 1995. The following is a brief summary of some of our projects.

Soil Remediation - Land Farming. While some of the following projects were treated in-situ, many in this category were addressed in land farming fashion. The soil was spread to a thickness of 12-18 inches, and then sprayed with the microbes, nutrients and a bio-catalyst. The soil was turned over every four weeks while moisture levels were maintained continuously. More frequent turning would speed up degradation.

UTAH - Compressor Station - 750 cubic yards contaminated with solvents to gasoline. TPH prior to treatment was 15,000 ppm., thirty days thereafter levels @ 17 ppm and the project was closed.

TEXAS - 900 cubic yards - The soils were similar to the above case - TPH prior to treatment @ 6,000 ppm. Five months thereafter TPH levels @ 24 ppm.

KENTUCKY - Oil Tank Farm - Cleaned residue, in below freezing temperature, in three months.

CALIFORNIA - Gas Station - clay soil contaminated with waste oil levels up to 5,000 ppm. Two months after treatment began, TPH levels were reduced by 90% and the site submitted for closure.

CALIFORNIA - Industrial Harbor - Bench study took silty clay sludge from TPH of 11,400 ppm. to 37 ppm. in 22 days.

ARIZONA - Service Station - Bench study in-situ (in place) injected microbes into soil with TPH levels at 7,000 ppm. Down to 350 ppm. in five weeks.

TEXAS - Performed a demonstration for a major oil company on heavy weathered crude. Prior treatment TPH levels were 95,800 ppm, one week later @ 14,620 ppm and one month levels @ 5,830 ppm.

TEXAS - 150 Cubic yards - Varsols, diesel, etc. Initial TPH levels @ 1,280, two months later @ 37 ppm.

LOUISIANA - 200 cubic yards - TPH prior to treatment @ 2,400 ppm, four months later, levels @ 2 ppm and project was closed.

ARIZONA - Copper Mine - Soil contaminated with diesel and oil. TPH levels up to 75,000 ppm. Six weeks thereafter TPH levels @ 240 ppm. Second job for same client underway.

LOUISIANA - 50 cubic yards - Small UST leak - diesel in good sandy soil. Prior to treatment TPH @ 1,200 ppm. Thirty days thereafter non-detect.

ARIZONA - Construction Yard - Soil with diesel fuel spill - TPH at 4,900 ppm reduced to under 50 ppm in 30 days.

ARIZONA - 1,500 cubic yards - School District Maintenance Facility - gasoline mixed in sandy clay. Cleaned up in 45 days.

ARIZONA - Soil with diesel levels 800-1,200 ppm, reduced to N/D in 5 weeks.

NEW MEXICO - Oil Field Production Pits - 2 well pits in progress.

***NEVADA** - 3,000 cubic yards - Service Station - In-situ using infiltration gallery and bio-venting.

OHIO - 400 cubic yards - Industrial Site - TPH prior to treatment @ 5,000-10,000 ppm of paraffinic oil in a clay mixture. Currently in progress.

OHIO - 100 cubic yards - Small UST leak - diesel and gasoline in a sand and clay mixture. TPH prior to treatment @ 5,000 ppm. Eight weeks thereafter 500 ppm. Treated by excavating soils and placing them back into the pit.

OHIO - 700 cubic yards - Junk Yard - motor oil in a sand and gravel mixture. Trenches were dug to treat this site in-situ. When treatment began, TPH was 18,000 ppm. Five weeks thereafter 1,270 ppm. This project is still in progress.

* In-situ applications utilizing infiltration galleries, injection wells have also been successful. The process is usually slower than land farming and dependent on the soil conditions.

COST

<u>BIOREMEDIATION METHOD</u>	<u>TYPICAL COST (\$/Cubic yd)</u>
1) Above Ground Soil Clean-up	\$15 - \$40
2) In-situ Applications	\$20 - \$45

CASE HISTORIES

The following three pages are degradation graphs of some of THE CRITTER COMPANY projects. Client confidentially prevents us from disclosing specific site information.

THE CRITTER COMPANY Inc. CASE HISTORIES

LOCATION

BALDWIN PARK, CALIFORNIA

USE OF SITE

SERVICE STATION

SOURCE OF CONTAMINATION

LEAKING UNDERGROUND TANK

TYPE OF CONTAMINATION & LEVELS

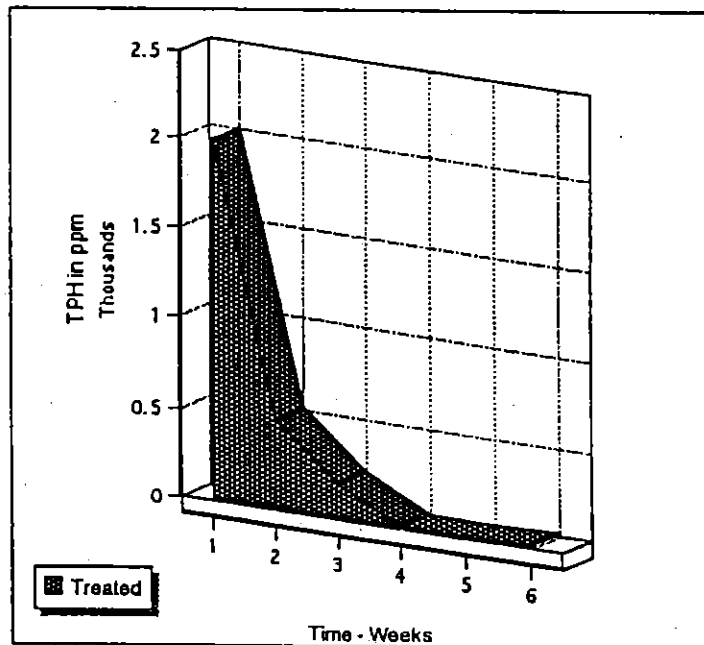
GASOLINE - 2800 PPM

QUANTITY OF MATERIAL & TYPE

200 CUBIC YARDS - SAND

TREATMENT METHOD

18" LANDFARM



LOCATION

LA HABRA, CALIFORNIA

USE OF SITE

COLLEGE MAINTENANCE FACILITY

SOURCE OF CONTAMINATION

LEAKING UNDERGROUND TANKS

TYPE OF CONTAMINATION & LEVELS

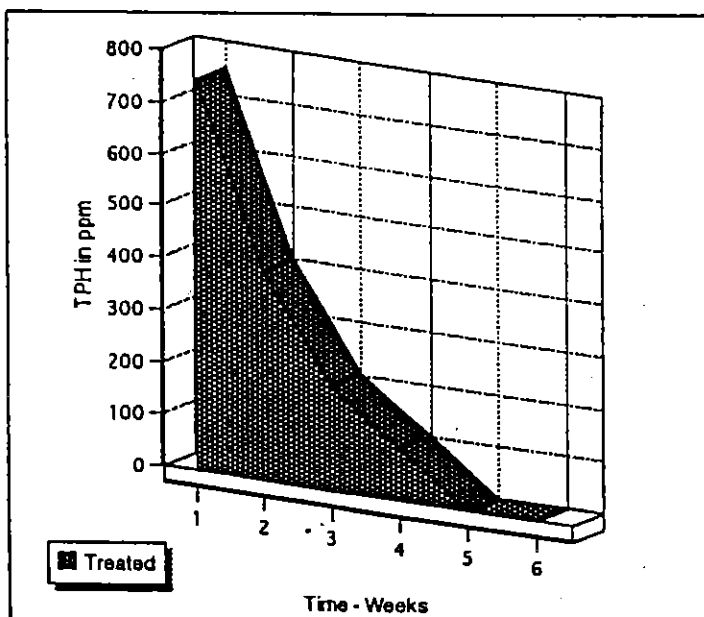
DIESEL & GASOLINE - 750 PPM

QUANTITY OF MATERIAL & TYPE

1500 CUBIC YARDS - SILTY CLAY

TREATMENT METHOD

18" LANDFARM



THE CRITTER COMPANY Inc. **CASE HISTORIES**

LOCATION

SAN DIEGO, CALIFORNIA

USE OF SITE

RESORT HOTEL - SOIL

SOURCE OF CONTAMINATION

LEAKING UNDERGROUND TANK

TYPE OF CONTAMINATION & LEVELS

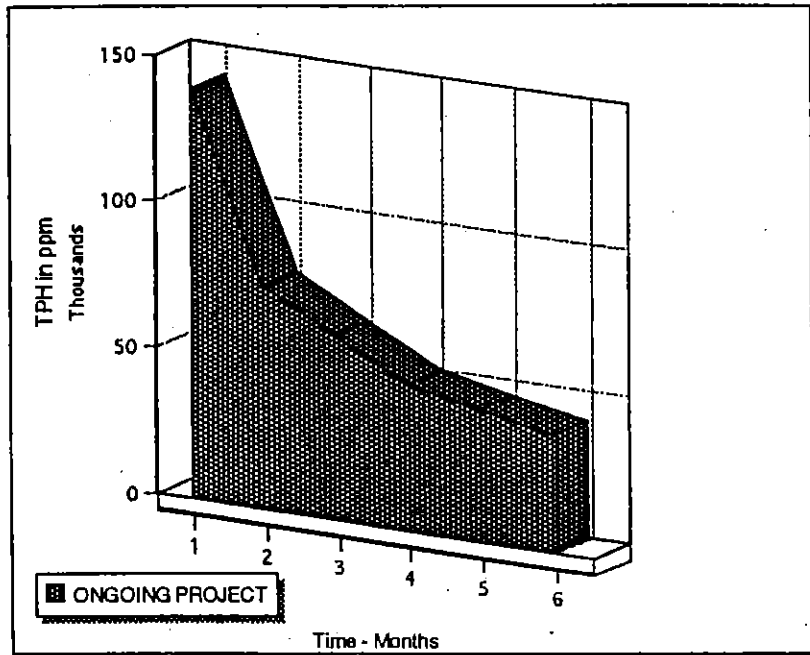
DIESEL - 100,000 PPM

QUANTITY OF MATERIAL & TYPE

2500 CUBIC YARDS - SAND

TREATMENT METHOD

INSITU - INJECTION WELLS



LOCATION

SAN DIEGO, CALIFORNIA

USE OF SITE

RESORT HOTEL - WATER

SOURCE OF CONTAMINATION

LEAKING UNDERGROUND TANKS

TYPE OF CONTAMINATION & LEVELS

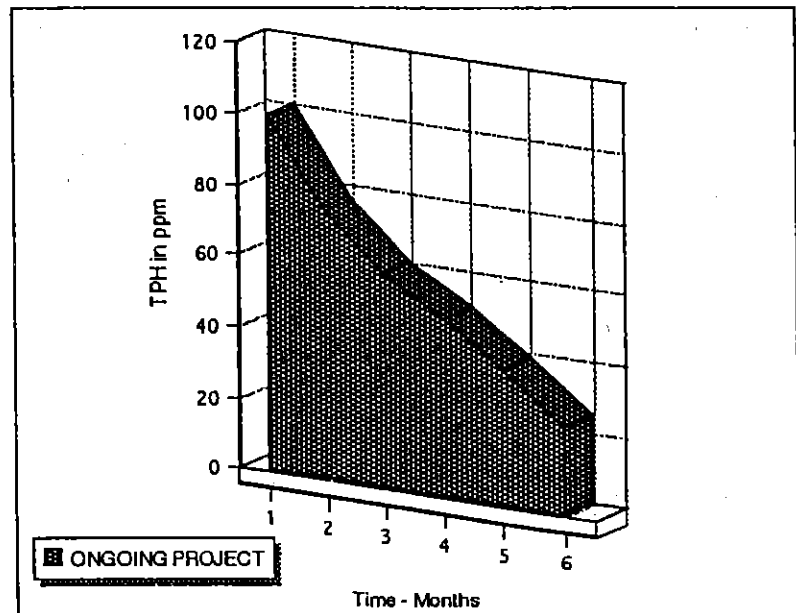
DIESEL ON GROUNDWATER

QUANTITY OF MATERIAL & TYPE

PSH - 1/4" FREE PRODUCT

TREATMENT METHOD

DIRECT APPLICATION TO GROUNDWATER



THE CRITTER COMPANY Inc. CASE HISTORIES

LOCATION

SANTA FE SPRINGS, CALIFORNIA

USE OF SITE

INDUSTRIAL

SOURCE OF CONTAMINATION

SERVICING HEAVY EQUIPMENT

TYPE OF CONTAMINATION & LEVELS

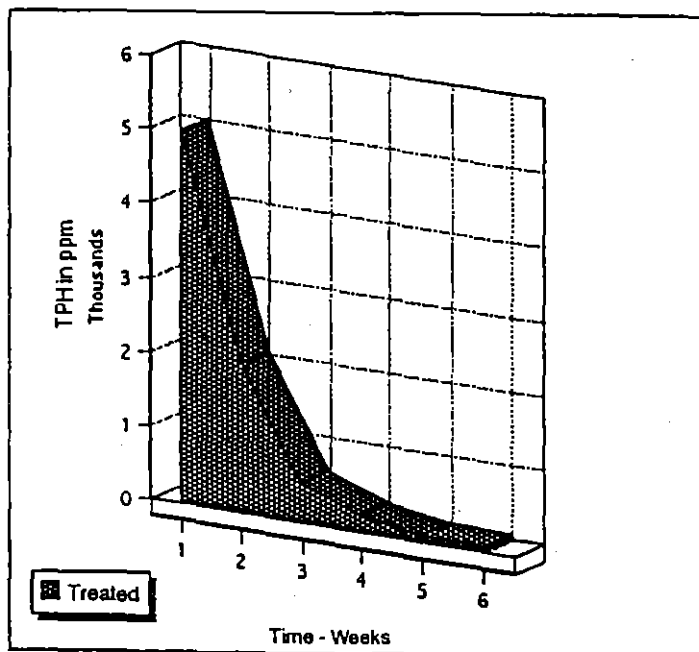
DIESEL & WASTE OIL - 5000 PPM

QUANTITY OF MATERIAL & TYPE

125 CUBIC YARDS - SANDY CLAY

TREATMENT METHOD

36" STATIC PILE



LOCATION

SAN DIEGO, CALIFORNIA

USE OF SITE

SERVICE STATION

SOURCE OF CONTAMINATION

LEAKING UNDERGROUND TANKS

TYPE OF CONTAMINATION & LEVELS

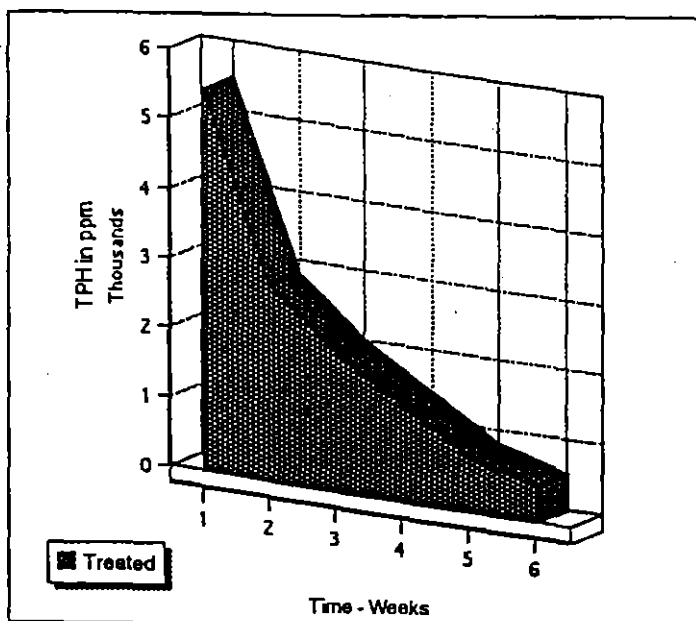
DIESEL & WASTE OIL - 5500 PPM

QUANTITY OF MATERIAL & TYPE

125 CUBIC YARDS - SILTY CLAY

TREATMENT METHOD

18" LANDFARM



KEY PERSONNEL

Jeremy Coon, Chairman of the Board. B.A. Marketing @ Yale and MBA @ Northwestern. Company founder and CEO, has successfully treated contaminated sites in more than 6 states. Established national marketing network with over 20 reps. Past 22 years founded a series of mining companies, land leasing companies, and processing plants. Developed and operated several large coal mines, both strip and deep.

Jack G. Roberts, President. B.S. Civil Engineering from University of Arizona. MBA graduate work at Stanford. Holds California "A" Contractors License with Hazardous Waste Endorsement. Has 25 years experience in engineering and management of large commercial companies.

James E. Blair. M.S. Degrees in Microbiology and Biochemistry. Jim has over 20 years experience in biological treatment of industrial waste. He has served in key managerial positions in Lancy International, Sybron, Rohm & Haas, and Alcoa Separation Technology. He currently serves as an international consultant on "Biotowers" requiring microbiological expertise. Mr. Blair has obtained 5 patents for microbiological processes, including the first microorganism patent allowed in the U.S.

James Waskovsky is now recognized as a world class expert in the isolation of bacteria that digests synthetic petroleum and heavy crude. His isolation techniques relating to bioremediation bacteria offers startling and unprecedented solutions to difficult problems which greatly reduce the degradation time process from months to weeks. He holds patents and has published technical articles on commercialization techniques for bioremediation.

Scott Klingensmith. B.A. Business Communications @ Otterbein College. Has successfully developed an extensive clientele network for the Critter Company in the Midwest and East. Past experience includes coordinating and implementing marketing programs for management and environmental consultants.

Matthew Puskarich. B.S. Political Science @ Otterbein College and holds a law degree from Wake Forrest University. Mr. Puskarich is a registered lawyer with the State of Ohio.

OFFICE LOCATIONS

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